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How long should suction drains stay in after breast surgery with axillary dissection?

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Daily suction drainage volumes were recorded for 63 patients after wide local excision of a breast carcinoma with axillary dissection ($n=37$) or mastectomy with axillary dissection ($n=26$). Suction drains were removed at the discretion of the clinical ward staff after a median of 4 days (range 1–7 days). In all, 32 patients (51%) later developed seromas requiring needle aspiration. Minor wound infection rate was not significantly higher in patients who developed seromas than those who did not (5 *vs* 2). Seroma formation was associated with a larger total suction drain volume (mean 480 ml (range 28–1150 ml) *vs* 240 ml (range 10–635 ml); $P=0.0001$). The median yield of axillary lymph nodes was significantly greater in those who developed seromas (11 (range 4–20) *vs* 8 (range 1–19); $P=0.002$). There was no difference in the volume drained in the 24 h preceding drain removal (mean 60 ml (range 0–150 ml) *vs* 50 ml (range 0–290 ml); NS). Keeping drains *in situ* longer did not protect against seroma formation. By 48 h, 74% of the total volume drained by each drain had been collected. Seroma formation after breast surgery with axillary dissection is an inconvenience for a high proportion of patients. This complication does not seem to be reduced by prolonged suction drainage of the wound, which in itself delays patient discharge and causes further inconvenience.

Seroma formation is a common complication after breast and axillary surgery *(1)*. The use of closed suction drainage postoperatively is a common practice that has been shown to reduce, but not prevent, seromas *(1,2)*. In the immediate postoperative period, serous fluid is removed via the suction drains, but after the drains are removed continued fluid production can lead to seroma formation. It has not been proven that prolonged drainage prevents subsequent seroma formation.

Retrograde migration of bacteria along drains has been well documented *(3,4)*. Standard orthopaedic practice is to remove all drains by 48 h postoperatively *(5)*. Patients with suction drains *in situ* are normally managed in hospital (although some authors advocate discharge with the drain *in situ (6,7)*). Continued presence of suction drains often delays their discharge.

It has been shown that ultrasound scanning can probably detect a much higher seroma rate after breast surgery than is clinically apparent *(8)*. As this study is concerned with events affecting patient satisfaction, we have concentrated on seromas large enough to be noticed by the patient or her carers.

The aim of this study was to document the seroma rate after breast surgery with axillary dissection. We also investigated the relationships of surgical procedure, suction drain volumes, and timing of drain removal to subsequent seroma formation.

Patients and methods

A total of 63 patients with carcinoma of the breast had either mastectomy or wide local excision, by one of two surgeons (RMW and CT), during a 6 month period. All patients underwent axillary dissection (node sampling or clearance to levels 1–3; Table I) with a median lymph

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Table I. Procedure summary

Extent of axillary dissection	*Mastectomy*	*Wide local excision*
Node sampling	5	15
Level 1	14	11
Level 2	5	11
Level 3	2	
Total	26	37

node yield of 10 (range 1–20). Patients with two separate incisions were excluded from the study.

Polyvinyl chloride tube drains, 6 mm external diameter, connected to a closed suction system (Redivac®, Medinorm, Nieuwegein, Holland) were used by RMW and 3 mm external diameter drains by CT. Wide local excision was performed in 37 patients, one drain being placed in the axilla, the other in the breast tissue; both attached to separate bottles. Mastectomy was performed in 26 patients, one drain (or two drains connected through a Y-connection) being placed under the skin flaps, the other in the axilla; both attached to separate bottles.

A record was kept of the 24 h drainage volumes for each drain. The removal day for each drain was decided by the ward clinicians, following their normal practice. Patients were allowed home after drain removal and follow-up was arranged as appropriate. They were told to report to the ward should they develop problems that they felt could not wait until their clinic visit. Seromas were only drained if the patient or their main carer drew attention to them in clinic or if they reported back to the ward. A syringe and 21G needle, with an intervening three-way tap, were used to aspirate the seromas. Local anaesthetic was not used.

Relationships between drainage volumes, type of surgery, lymph node yield, and seroma formation were analysed retrospectively. Statistical significance was calculated using Student's t test, the χ^2 test, and the Mann–Whitney U test, as appropriate.

Results

Seromas were aspirated from 32 patients (51% of those studied). Patients required a median of two aspirations (range 1–7) on separate occasions. Development of a seroma was not a significant risk factor for wound infection; five minor wound infections occurring in the seroma group and two in the no-seroma group (NS). No long-term sequelae have followed seroma formation and patients did not find aspiration unduly painful.

The seroma rate was not significantly higher in the mastectomy with axillary dissection group than the wide local excision with axillary dissection group. A higher yield of lymph nodes (median 11 (range 4–20) *vs* 8 (range 1–19); $P=0.002$) was a significant risk factor for seroma formation (Table II).

The total volume of fluid drained into both bottles was significantly higher in the group of patients who subsequently developed a seroma (mean 480 ml (range 28–1150 ml) *vs* 240 ml (range 10–635 ml); $P=0.0001$). In all cases, the drain from the breast (or mastectomy skin flaps) was removed first, but the axillary drain was left *in situ* as it continued to drain. The mean volume drained into the axillary drain in the 24 h before its removal was similar in patients whether or not they later developed a seroma (60 ml (range 0–150 ml) *vs* 50 ml (range 0–290 ml), respectively). The median number of days that the axillary drain was left *in situ* was higher in the group who later developed a seroma (4 days (range 2–7 days) *vs* 3 days (range 1–6 days); $P=0.003$) (Table II). Each drain had drained on average 74% of its total volume after 48 h.

Discussion

The high seroma rate seen in this study mirrors that previously seen in tamoxifen treated patients after axillary dissection *(2)*. More seromas were seen when a larger number of lymph nodes were dissected from the axilla, which has not been shown before. The higher lymph node yield may well be an indirect measure of a more extensive axillary dissection in these patients.

Suction drainage has been shown to reduce the incidence of seroma formation *(1)* but not prevent it. This was the case in these patients. It is not surprising that patients producing large volumes of serous fluid in their suction drains continue to produce large volumes of fluid after drain removal, in the form of a seroma. Our data would suggest that judging the likelihood of seroma formation by looking at the volume drained in the last 24 h is not possible. Indeed, keeping the drains *in situ* for an extra day (on average) did not protect against seroma formation.

Further work, in the form of controlled trials, needs to be done to ascertain the optimum time for drain removal.

Table II. Factors predicting seroma formation

Surgery	*Seroma*	*No seroma*	*P value*
Mastectomy + axillary dissection	16	10	NS
Wide local excision + axillary dissection	16	21	NS
Median node yield	11	8	0.002
Mean (range) total drainage volume (ml)	480 (28–1150)	240 (10–635)	0.0001
Mean (range) drainage in 24 h before removal (ml)	60 (0–150)	50 (0–290)	NS
Median day axillary drain removed	4	3	0.003

It may be that techniques other than prolonged suction drainage, such as sutures *(9)* or tissue glues *(10)* to close the dead space, will prove better at preventing seroma formation.

Apart from the minor inconvenience and discomfort of aspiration, it does not appear that seroma formation is a serious complication. At present it seems that keeping suction drains in for as long as 4 days postoperatively is not protective. Patients may be less inconvenienced by being allowed home earlier, with the explanation that they have about a 50% chance of developing a seroma that will need a simple aspiration on one or more occasions. Again, further evaluation of this management strategy and patient satisfaction is required.

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